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ARMY INVENTORY RESEARCH OFFICE PHILADELPHIA PA
DATA BASE FOR NICP ORIENTED PROBLEMS.(U)
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The Army Inventory Research Office has been collecting and continues to collect the Demand Return and Disposal File from the TSARCOM (aviation items, AVSCOM). Presently a history from 1967 to 1977 is available in a summarized form which is used for various simulation and data analyses by IRO. This report documents the content of the data base and describes the procedure for its compilation.		

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INTRODUCTION

The Army Inventory Research Office (IRO) has been collecting and continues to collect the Demand Return and Disposal (DRD) File from the TSARCOM (aviation items, AVSCOM). Presently, a history from 1967 to 1977 is available in a summarized form which is used for various simulation and data analyses by IRO. As new DRD's arrive (every two years) the data base is extended by "tacking on" the new history to the old.

Although there are some intermediate demand transaction history files produced by processing the data, the version which has been used consists of the number and quantity of requisitions by quarter from 1967 thru 1977 by National Stock Number (NSN). There are three critical steps in the process:

- (1) Identifying a demand from the transaction history.
- (2) Determining what demands to include in the data.
- (3) Assigning the demand to NSN.

Each of these steps is discussed below.

Identifying a Demand

A transaction was identified as a demand by way of the Document Identifier Code (DIC). This is described in Chapter 2, Section 2.1.

Determining What Demands to Include in the Data

Since the data was to be used mostly to analyze aspects of Variable Safety Level/Economic Order Quantity (VSL/EOQ) computations, the intent of the selection process was to include demands which would normally compose what the Commodity Command Standard System (CCSS) calls the Base AMD. In CCSS the composition of the base AMD depends on whether the item is studied as a low or high dollar value (LDV or HDV) item. For LDV items virtually all demand is included in the base AMD. It was decided to select demands as though each item was an HDV item. From a research point of view, this was a neater and more assuring method than if the items were treated as LDV's. Once a transaction is identified as a demand, the program code is reviewed to determine if that demand is to be included. Basically, Set Assembly, Rebuild, Foreign Military Sales, Grand Aid, Initial Issue, Mobilization and Supply Support demands were not included. A more detailed description is in Chapter 3, Section 3.3.

Assigning a NSN

This is a particularly irksome problem which occurs because new items are always entering the system and replacing the older items. We identify the demand for an NSN to the prime NSN, unless the IMPC code for the demanded NSN indicates that the item is no longer issuable. In that case, the demand is assigned to the demanded NSN so that any excess stock caused by obsolescence can be identified. Demanded NSNs which cannot be related to a prime are excluded unless there is an indication that they are terminal or obsolete.

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CHAPTER I

GENERAL BACKGROUND

1.1 The Requisition File

Requisitions occur for both prime and related stock numbers. Only the prime item is bought, but there may be stock on hand for related items which are considered substitutable for the prime. In this case we can consider stock for a related item when determining what assets are available to fill a prime requisition, and we are not necessarily left with excess stock for an old item if it is issuable as a related item.

If an old item can be used to fill current requisitions we want to include demands for this item in the history for its prime. The Reference Number (REFNO) file is a cross-reference index to the National Stock Number Master Data Record (NSNMDR) file and contains each National Stock Number (NSN) with a reference to the current prime stock number. In addition it includes the Inventory Management Processing Code (IMPC) for each NSN and its prime, a code designed to indicate the status and/or supply level for the item. We use the REFNO to determine the prime for a related item; unless the IMPC indicates that the item is no longer issuable, we include demands for the related item with those for the prime by changing the related stock number to that of the prime.

Care must be taken not to eliminate visibly obsolete items from the history by changing their stock numbers to a new prime. If an item's stock cannot be used to fill demands for a new prime then it must be considered obsolete and its demand history terminated. Terminating an item's demand history means leaving it under the old prime for which there will be no new demands. It does not mean the item is eliminated from the data base. Retention of obsolete items enables us to simulate excess stock.

Making the requisition file involves converting the new DRDs as we receive them to the requisition file format, and updating the stock numbers to reflect the new primes. The IMPC from the REFNO file is used to determine if an item is obsolete, in which case the stock number is not updated to reflect the new prime, but retained as an obsolete item. The file is then sorted by prime and can be merged with the previous requisition data. The

result is a file of chronological requisitions, sorted by prime NSN.

1.2 The Summary File

Over the 11 year period, AVSCOM had requisitions for nearly 100,000 items. This is clearly too much data to be handled with ease, hence we summarized the history for each item. We divided the 11 years into calendar quarters and retained only the number of requisitions and demands falling into each of the 44 quarters.

We eliminated non-recurring demands and Supply Support Arrangements with a foreign customer, and eliminated items not purchased through central procurement, based on the last recorded IMPC code. Every attempt was made to drop items subject to logistical transfer. A detailed description of all items dropped from the data base is included in 3.3.

We matched the remaining items against the NSNMDR to pick up header data - which includes unit price, lead times, IMPC, and accounting codes. A detailed description of the fields and file descriptions is included in Chapter III. An explanation of the NSNMDR file processing is included in Appendix C.

The final step was to add flying hours for each NSN collected from AVSCOM by aircraft system. For a description of the flying hours, see [1]. The result is a summary file by NSN which is input to the ALPHA 4140.39 simulator [2].

1.3 The Ideal Procedure vs the "Tack On" Method

Ideally we would like to have a requisition file which covers the entire time period of our data base, but we are unable to handle that quantity of data. The ideal procedure would be to process each DRD and merge with the existing requisition file, updated to reflect the new primes. This expanded requisition file could then be summarized and edited as desired. Editing includes dropping unwanted items and adding header and flying hour data.

Once we have a summary file for several years, it is more feasible to "tack on" two more years without going back to the original requisition file. The "tack on" method summarizes each two years as they come and then

combines the new data with the existing summary. With the amount of data that we have, this is the more reasonable approach and will be used for future additions to the data base. It means, however, that we will not have a continuous requisition file for the time period covered by the data, although such a file could be created with effort if needed.

CHAPTER II

PROCEDURE

2.1 Creating the Requisition File

There are four steps required to create an X+2 year requisition file from an X year requisition file and a 2-year DRD:

Step 1: Process the DRD (PROCD).

Step 2: Update the primes on the X year file to year X+2 (UPDATE)

Step 3: Sort the updated X year file on the new prime (SORT).

Step 4: Concatenate and sort the X year file with the processed DRD.

Each step is one computer program (the name in parentheses) and the details of each step follow.

Step 1: Process the DRD (PROCD)

The two major functions of this program are:

- (a) Select the demand records.
- (b) Condense the DRD record format.

There are three kinds of records on the DRD: Demands, Returns, and Disposals, identified by a record code of "001", "002", and "003" respectively. We use a more complicated procedure for selecting demands than merely choosing records with record code "001", because some of these records, such as supply status records, we do not wish to consider as demands.

The Document Identifier Code (DIC) on the DRD denotes the type of transaction (demand/requisition, return/receipt, or disposal) recorded on that line entry and we use this code to select demands as follows:

Include all A0's and Z0's

Include all A1's and Z1's

except when fund code is

G2, G3, G4, G6, GJ, GK, or GM

and signal code is D or M.

Include all A3's and Z3's.

A list of DICs for demand related records is included in the file description. A complete list of DICs and related codes can be found in Vol 3, CCSSOI 18-710-102.

Since we do not use the record code to select demands, we retain the DIC in our file in case future separation of the "other" file is necessary. The "other" file contains all the records that do not qualify as demands. No further processing has been done to this data.

The second function of processing the DRD is to condense the record format to include only those data elements which we need. A description of each of the fields is in the file description.

Because we have no way of combining their demands, items with more than one unit of issue are eliminated. This amounts to less than 1% of the data.

Step 2: Update the Primes (UPDATE)

This program updates the stock numbers on the DRD to reflect the new primes, as found on the REFNO. Each record from the DRD for a given time period (2 years) is matched with the REFNO from the next time period to determine whether the item is still a prime, and if not, whether the item should be combined under the history of a new prime. In general, the IMPC codes fall into three categories: active, terminal (but issue to exhaust), and obsolete. The IMPC on the REFNO which relates to the stock number on the DRD (not the prime) is checked. If it is terminal, the prime stock number is output along with the IMPC from the REFNO which relates to the prime. Any indication that the item was terminal is lost, as these items will be issued under the new prime.

If the IMPC is obsolete, the stock number from the DRD is output along with the IMPC from the REFNO which relates to this number. This IMPC will indicate obsolescence.

Items not found on the REFNO are output with the old prime, the old IMPC, and an appropriate code to indicate that they are not on the REFNO. They are checked in more detail later in the processing, and eliminated unless there is indication that they are terminal or obsolete.

Each requisition is matched with a series of REFNOs, in turn, to update the primes in successive 2-year increments. The 1966-71 data is first matched to reflect the 73 prime, then the 75 prime, and finally the 77 prime. At each match we replace the stock number with a new prime if

appropriate, and store the IMPC which relates to the new prime.

We also retain the IMPCs from all previous matches to the REFNO. As each 2-year DRD is added to the requisition file, a new IMPC field is maintained in the file format. This gives us a string of IMPC codes for the item over time. Some problems with this string of codes, and a description of each code are included in Appendix A.

Step 3: Sort on the New Prime (SORT)

The updated demand file is sorted on the new prime, which we identify by the 9 character NIIN (National Item Identification Number). The NIIN is part of the 13 character prime NSN.

Step 4: Concatenate and Sort (MERGE)

This is a data processing step which combines separate record streams into a single stream. For convenience, the original data is processed separately, in individual pieces.

2.2 Creating the NSN Summary File

There are six steps to create the summary file, numbered 5 thru 10

Step 5: Roll up demands and requisitions by NSN (ROLL).

Step 6: Combine data for NSN for 2 time periods (BLEND).

Step 7: Exclude unwanted items (SKIPS).

Step 8: Add header data from NSNMDR (MATCH).

Step 9: Add flying hours (PFACT).

Step 10: Separate into categories; make binary (SLECT).

Details of each step follows:

Step 5: Roll Up Demands and Requisitions by NSN (ROLL)

This process combines all the requisitions for an item (NSN) onto one record with a summary of requisitions and demands by calendar quarter.

For each item:

Process each requisition.

Read requisition.

Throw out (by requisition)

- Requisitions with demand quantity zero.
- Requisitions from 1966 and from outside range.
- Requisitions non-recurring.

Add the demands and requisitions to the appropriate sum
(if the requisition is kept).

After all the requisitions for an item have been processed:

Throw out (by item)

- Items with possibility of partial history.
- Items other managed or procured and stocked for depot maintenance only.
- Items specific by NIIN.

Write summary (if the item is kept).

A detailed explanation of the requisitions and items thrown out is in Chapter III.

Step 6: Combine Data for NSN for 2 Time Periods (BLEND)

When accumulating data from the 1972-75 file, we allow for requisitions with a document date in 1971. Requisitions submitted in late 1971 may still be undergoing processing in 1972, and hence may appear on the 72 DRD. In the BLEND process we add these 71 requisitions to the 71 requisitions for the item from the 1966-71 file.

When 2 records for an item are combined, the common information (NSN, fund, program) is taken from the later file, except the string of IMPCs. Since not all records were matched to every REFNO, the IMPC string is taken from the earliest file, which was matched with the maximum number of REFNOs, and hence will have the most complete string of IMPCs.

Step 7: Exclude Unwanted Items (SKIPS)

This program skips two classes of item:

- a. Items not subject to demand forecasting (by IMPC).
- b. Items for which we may not have a complete history when we should.

We keep only those items subject to demand forecasting and eliminate all others on the basis of the IMPC code. Examples of items eliminated include "fabricate or assemble," "other managed," "local procurement," and "special handling." A description of the IMPCs for items that we did keep is included in Appendix A. If an item is not on the latest REFNO and the latest recorded IMPC does not indicate

terminal or obsolete, the item is skipped. We do not have an explanation for these items. Possibilities include: they should be on the REFNO but aren't; they are terminal or obsolete but were not properly coded; and they are no longer managed by AVSCOM (TSARCOM) because of a logistics transfer.

Step 8: Add Header Data From NSNMDR (MATCH)

This program matches the remaining items to the NSNMDR file to pick up header data. The few items not found on the NSNMDR are excluded. The data elements included from the NSNMDR are unit price, administrative and production lead times, IMPC, study method code, materiel requirements list code, recoverability code, and financial inventory accounting code. These data, then, are the latest available to us, not those from the time of the requisition. The only information retained in the final summary file from the DRD are the number of requisitions, the quantity of requisitions, and the identifying NSN, which may be updated to a new prime from the REFNO. We also maintain the string of IMPC codes, which contains the IMPC from the original requisition, if the stock number was not replaced with a new prime.

In addition to the header information we pick up from the NSNMDR the applications of the items, and the quantity per assembly and failure factor for each. These data are used to enable us to match up flying hours for the item, but are not retained on the binary summary file.

Step 9: Add Flying Hours (PFACT)

The achieved flying hours for each aircraft system are collected by hand from the Command Focal Point for Flying Hours at AVSCOM (TSARCOM). If the hours are received by month, they must be accumulated into quarterly sums. As of 1977 we had hours for 73 aircraft systems; an additional 10 common hardware designators are included in our table to prevent the exclusion of NSNs with no other application. These common hardware designators include things like tools, for which we would not expect to see flying hours.

The computer program (PFACT) looks up each application in the flying hour table to find the hours. For an item with several applications, the flying hours are simply added for all applications. The quantity per application and maintenance factor were taken from the NSNMDR for the purpose

of weighting the hours, but these data were suspect and we did not use them.

Step 10. Separate Into Categories; Make Binary (SLECT)

This program is the final step, which prepares the data in a form that can be used as input to the ALPHA 4140.39 simulator. Some data elements which are not used in the simulator are dropped at this point. File descriptions of the data base both before and after this step are included.

The program converts the data to binary and separates the items into four classes: dynamic and non-dynamic within high and low dollar value [1]. The major items and those with more than \$1 million average yearly demand are written off to a fifth file, which we do not use in the simulator. Statistics are accumulated on the distribution of particular fields in the data base.

2.3 How to Expand the Data Base

To create an X+2 year summary file from an X year summary file and 2-year DRD, it is most efficient to use the "tack on" method.

(1) Prepare 2 years

PROCD

ROLL

(2) Prepare Old Summary

UPDATE

SORT

(3) Combine Outputs From (1) and (2)

BLEND

(4) Complete New Summary

SKIP

MATCH

PFACT

SLECT

CHAPTER III

THE DATA BASE

3.1 Project History

The data we received from AVSCOM (TSARCOM) consisted of six sets of 2-year DRD files covering the period from 1966 thru 1977, each with cut-off date December 31 of the odd year. In addition we received the REFNO and NSNMDR extract files as of the end of the odd years. In 1974 Arthur Hutchison made a requisition file of the 1966-71 data. This consisted of 17 individual files of data. Harold Wyzansky made a summary file of these six years. Using the "tack on" method, Martin Cohen added the 72-73 data to the summary and included the flying hours available for 1967-75. This is our commonly used 7-year data base.

In 1977 we attempted to create an 11 year requisition file. This involved updating the 1967-71 requisition history to reflect the 73 prime, merging with the 72-73 requisitions, updating to the 75 prime, and so on. This task proved too much to handle but we did get two requisition files out of the processing. The first is the 1966-71 data updated to and sorted, first on the 1973 and finally on the 1975 prime (9 reel file). The second requisition file is the 1972-75 requisitions updated to and sorted on the 1975 prime (6 reel file).

These two files are too large to combine in requisition form so we resorted to the "tack on" method. The 66-71 and 72-75 files were summarized separately and then the summaries were combined. Finally, this 1966-75 summary was updated to reflect the 1977 prime and the 76-77 data was added by the "tack on" method.

Flying hours were available for 1967-77 so we now have an 11 year summary file. It must be noted that the 11 year summary was produced without use of the 7-year data base in order to include items excluded in the previous work. The details of what items are included in the new file are in Chapter III. Some charts and flow diagrams describing the processing are in Appendix D.

3.2 Fields and File Descriptions

Included here will be the formats for the two final files which we created: the requisition file and the summary file. Excluded are the

inputs: the CCSS extracts we received from AVSCOM (TSARCOM) of the DRD, REFNO, and NSNMDR, and the demand file format of the requisition file made in 1974 of the 1966-71 data. A new demand file format was necessary to compensate for changes to the DRD over the years. The DRD, REFNO, and NSNMDR fields and formats were all changed over the years covered, but a report of the changes and what we did to compensate would be of little benefit.

Recall that we do not have an 11 year requisition file. We do have the 1966-71 data updated to the 75 prime, the 1972-75 data updated to the 75 prime, and the processed 77 DRD. If use of the requisition files is to be made, a sample of NSNs must be selected from the three sources and this sample could be processed to complete a small 11 year requisition file. This would involve updating the samples to reflect the 77 prime, and eliminating unwanted items, such as those not applicable to demand forecasting. The "other" file format is the same as the requisition file format, but these data were not processed beyond extracting data elements from the DRD. We have five reels from the 1966-71 data in the old requisition file format (not included here), and one reel each from the 73, 75 and 77 2-year DRDs in the new requisition file format.

The format for the summary file will be given before the final program (SELECT) which reduces the format to just those data elements used in the simulator. A list of these elements is also included.

THE REQUISITION FILE# CHARACTERS

PRIME NSN	13
ADDRESS	6
DOCUMENT DATE	4
DEMAND OR CONDITION CODE	1
LOCATION	3
PRIORITY	2
QUANTITY	6
FUND CODE	2
PROGRAM CODE	1
SUBMITTED FIIN	7
PROJECT CODE	3
IMPC	2
UNIT PRICE	9
UNIT OF ISSUE	2
DOCUMENT IDENTIFIER CODE	3
IMPC STRING	6
	<hr/>
TOTAL	70

An explanation of the fields follows. For fields from the DRD see [3].

PRIME NSN (13)

FSC(4), NATO(2), FIIN(7)

For data thru 73, the NATO code was filled with "00" to indicate CONUS. After 73 the DRD has a 13 character NSN.

ADDRESS (6)

Indicates the ship-to address.

If signal code is J, K, L, or M this is the Supplementary Address field from the DRD. Otherwise it is the Requisitioner Code part of the Document Number on the DRD (1st 6 of 14).

DOCUMENT DATE (4)

Year (1), Day (3)

Date of Requisition from Document Number on the DRD (7 thru 10 of 14).

DEMAND OR CONDITION CODE (1)

For records with record code on DRD = "001" this field is the DEMAND CODE.

Examples:

R	Recurring Requisition Demand
N	Non-recurring Demand
O (Alpha)	No Demand (Request for sub-item)
P	Non-recurring One-Time Demand for Special Program Requirements.

For all other records (record code on DRD = "002", "003") this field is the CONDITION CODE.

Examples:

A-D	SERVICEABLE
E-H	UNSERVICEABLE
J-N	SUSPENDED

LOCATION (3)

Indicates the location of the depot that filled the demand.

Examples: AQ5 - Sharpe Army Depot

AN5 - New Cumberland Army Depot

On the 73 DRD this field is called DMD DEP (demand depot).

On the 75 DRD this field is called RIC (Routing Identifier Code).

PRIORITY (2)

Integer from 1-20 indicating force/activity and urgency of need.

QUANTITY (6)

Final Demand Quantity

On the DRD there are three quantities (original, revised/cancelled, & final). We retain only the final quantity.

The QTY field on the DRD is 9 with 2 decimal places (F9.2). We round to a 6 digit integer.

FUND CODE (2)

This code indicates distribution funds to be charged on reimbursable requisitions and definitizes the type of transaction on non-reimbursable requisitions [AR 725-50].

Examples:

G2 - Testing and sampling

GK - Transfer between storage locations

This 2 character code should not be confused with the second position of the FIA code on the NSNMDR, which indicates ASF or PAA.

PROGRAM CODE (1)

A code assigned to identify demands and returns by program type for summary purposes.

Codes

- A - Set Assembly
- B - Depot Rebuild
- C - Contractor Rebuild
- F - Foreign Military Sales
- G - Grand Aid
- I - Initial Issue
- M - Mobilization
- S - Supply Support Arrangements

SUBMITTED FIIN (7)

On 72-73 and 74-75 DRD extracts there are three item numbers:

- a. STK-NO (as submitted may be a part number)
- b. CUR-SN (above converted to a legal NSN)
- c. PRI-SN (the prime for CUR-SN)

We would wish to keep the CUR-SN (as an indication of the item ordered); however, it is only filled in if there is an actual change in stock number, not (as is suggested above) to convert a part number to a legal NSN. Examination of the 75 DRD reveals that the submitted field has been converted from an 11 character FSN to a 13 character NSN, regardless of whether the field was an FSN. That is, a "00" NATO code has been inserted into the middle of part numbers. We did this for the 73 DRD. The third position of the Document Identifier Code indicates what the submitted number is, i.e., part number or NSN.

PROJECT CODE (3)

A code for identifying requisitions, related documents, and shipments of materiel for specific projects, programs or maneuvers. Identifies specific programs to provide for funding and costing at requisitioner or supplier level to satisfy program cost and analysis, including an indication of transactions within or outside of the federal government [3].

IMPC (2)

Inventory Management Processing Code

Examples:

AA-AE	Stocked Items
OA-OZ	Other Managed
1A-1Q	Stocked Items
2A-2D	Non-stocked Items
6A-6Q	Terminal Items
9A-9X	Obsolete Items

This field on the DRD is for the submitted NSN and may not be the same as the IMPC assigned for the prime NSN.

UNIT PRICE (9)

Dollars and cents (F9.2)

Unit price from 66-71 requisition file is converted to this format.

Unit price on the DRD is for the prime NSN.

UNIT OF ISSUE (2)

Most are "EA" for "each".

DOCUMENT IDENTIFIER CODE (3)

Examples of 1st 2 Positions

A0 - Requisition
A1 - Supply Directive
A2 - Redistribution Order
A3 - Passing Order
A4 - Referral Order
AE - Supply Status
D6 - Materiel Receipt

3rd Position

for

Shipment With	Domestic/Overseas
NSN	A / 1
Part-No	B / 2
Long Part-No	C / 3
Other	D / 4
Exception Data	E / 5

Z's are the same as A's except manual.

IMPC STRING (6)

See Appendix A.

THE SUMMARY FILE

ICODE	3 - 3 digit integer with either 0 or 1 in each position. The 3 positions represent 67-71, 72-75, and 76-77 respectively. 0 indicates no record from the period. 1 indicates record from the period.
YEAR	1 - Year of NSNMDR from which header data is taken.
FSC	4 - Federal Supply Classification
NIIN	9 - National Item Identification Number - used to identify item.
IMPC STRING	8 - From demand file. See Appendix A.
UNIT PRICE	9 - Dollars and cents (F9.2) from NSNMDR.
ALT	3 - Administrative Lead Time in 10ths of a month from NSNMDR.
PROLT	3 - Procurement Lead Time in 10ths of a month from NSNMDR.
IMPC	2 - From NSNMDR
SMC	2 - Study Method Code from NSNMDR not used.
MRL	1 - Materiel Requirements List Code from NSNMDR not used.
RECOV	1 - Recoverability Code from NSNMDR not used.
FIA	5 - Financial Inventory Accounting Code from NSNMDR MGR(1), FUND(1), SEQ(1), WPSYS(2)
INOS	60 - 6 fields of 10 each. Each 10 consists of Quantity Per Assembly (5) and Maintenance Factor (5). The 6 fields allow data for up to 6 End Article Applications.
NEAAS	1 - Number of End Article Applications
IFIGS	440 - 44 qtrs of [requisitions (3 characters each) and demands (7 characters each)]
FLSUM	264 - 44 quarters of flying hours, each a 6 digit integer.
TOTAL	816

THE SUMMARY FILE

ICODE	3 - 3 digit integer with either 0 or 1 in each position. The 3 positions represent 67-71, 72-75, and 76-77 respectively. 0 indicates no record from the period. 1 indicates record from the period.
YEAR	1 - Year of NSNMDR from which header data is taken.
FSC	4 - Federal Stock Class
NIIN	9 - National Item Identification Number - used to identify item.
IMPC STRING	8 - From demand file. See Appendix A.
UNIT PRICE	9 - Dollars and cents (F9.2) from NSNMDR.
ALT	3 - Administrative Lead Time in 10ths of a month.
PROLT	3 - Procurement Lead Time in 10ths of a month.
SMC	2 - Study Method Code - not used.
MRL	1 - Materiel Requirements List Code - not used.
RECOV	1 - Recoverability Code - not used.
FIA	5 - Financial Inventory Accounting Code from NSNMDR MGR(1), FUND(1), SEQ(1), WPSYS(2)
INOS	60 - 6 fields of 10 each. Each 10 consists of Quantity Per Assembly (5) and Maintenance Factor (5). The 6 fields allow data for up to 6 End Article Applications.
NEAAS	1 - Number of End Article Applications
IFIGS	440 - 44 qtrs of [requisitions (3 characters each) and demands (7 characters each)]
FLSUM	264 - 44 quarters of flying hours, each a 6 digit integer.
TOTAL	816

THE BINARY SUMMARY FILE (Non-formatted)

FSN	- FSC and NIIN
IMPC	- From Latest Available NSNMDR
FSC	- Repeated as above
MGR	} FIA Code
FUND	
SEG	
WPSYS	
UNIT PRICE	- Unit Price from NSNMDR in cents
PROLT	- Procurement Lead Time in 10th of a month
WPSYS	- Weapon System - repeated as in FIA Code
NEAAS	- Number of End Article Applications
FRQ(I), I = 1, 44	- Requisition Frequency
QTY(I), I = 1, 44	- Demand Quantity
PRGDAT(I), I = 1, 44	- Flying Hours

This is the required input data to the 4140.39 simulator. We have a subroutine designed to read the data for the simulator. This subroutine converts the PROLT to years and converts the Unit Price to dollars.

3.3 Which Items We Have and Which Requisitions Are Included for Each Item

In creating the requisition file we intended to keep all the requisitions. Those not chosen as demands in the DRD processing were written off to the "other" file. Data were lost, however, due to processing problems beyond our control. The details on these losses are included in Appendix B. We assume the losses were random; however, Appendix B should be read by those wishing to use our final results.

In creating the summary file we excluded certain requisitions from the summary counts and eliminated some items entirely.

Requisitions Excluded

- Requisitions with demand quantity zero.

These are a result of CCSS corrections to the DRD. If an erroneous requisition is put in the file, when it is discovered a corrected record is added and the quantity on the original record is set to zero.

- Requisitions out of range.

As mentioned before, we allowed for requisitions submitted in 1971, but appearing on the 1972 DRD. There was some concern that we picked up the same requisition twice (the corrected record from the 1972 file and the uncorrected record from the 1971 file), but only 3471 out of 47,674 items had documents for 1971 in the 1972 file. In most cases this amounted to only one or two requisitions in the 4th quarter only. We also found requisitions for zero at the end of 1971, so there is evidence that we did not double count. Otherwise, requisitions with a document date outside the period of the file were excluded. This amounted to .007% of the requisitions.

- Requisitions from 1966.

These were excluded because we do not have the corresponding flying hours.

- Requisitions non-recurring or special purpose.

Non-recurring demands are generally for one time needs. Those of the provisioning type include Initial Issue, Foreign

Military Sales, and Grant Aid. Those bought for a specific purpose include Mobilization, Set Assembly, and Rebuild. We exclude Supply Support Arrangements with a foreign customer although we do not consider them to be strictly non-recurring.

Items Excluded

- Items for which we may not have a complete history when we should. The logic is to throw out items not on the REFNO when the latest recorded IMPC does not indicate terminal or obsolete. The following flow diagram shows the details of the logic as applied to the 1966-71 data. Similar reasoning is applied (to the entire data base) in program SKIPS.
- Items other managed or centrally managed but procured and stocked for depot maintenance. These are coded with IMPC's Q and ID respectively.
- Items with specific FIINS were excluded to compensate for data processing problems.

The FIINS eliminated were:

0330312-0699546

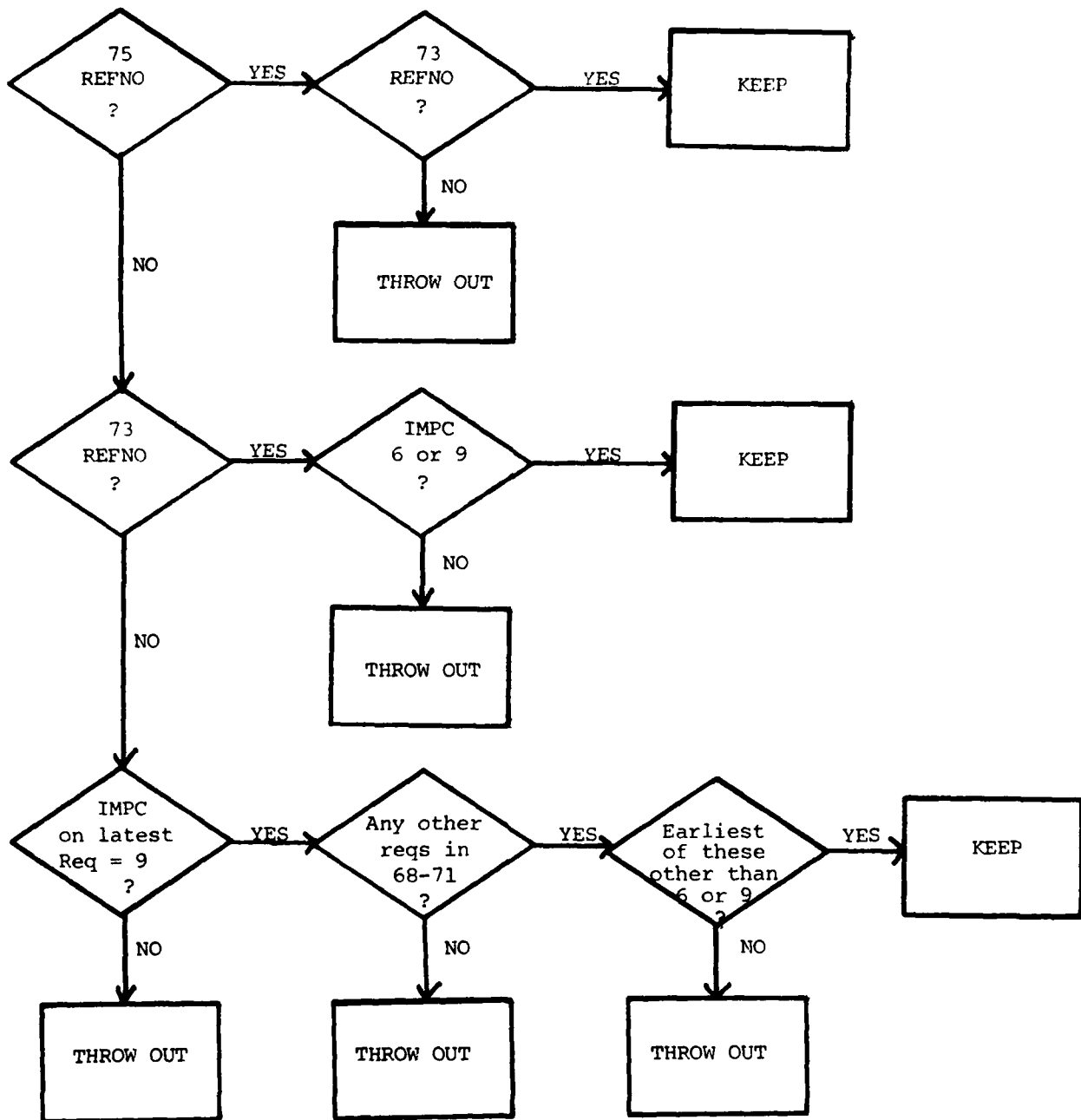
4923685-5752111

6595605-6931694

7592886-7969734

The details of why we did this are in Appendix B.

LOGIC TO ELIMINATE ITEMS FOR WHICH WE MAY NOT HAVE COMPLETE HISTORY



No items were eliminated in the BLEND process but we did collect statistics showing how many items had data in each time frame.

BLEND 66-71 with 71-75

24,171	67-71 only	46,958
22,787	both	
9,012	71-75 only	31,799
<hr/> 55,970		

BLEND 67-75 with 75-77

37,580	67-75 only	55,970
18,390	both	
2,610	76-77 only	21,000
<hr/> 58,580	items out	

To avoid confusion with our previous 7-year data base, I will point out some data that were not excluded. For a further description of these data, see [1].

1. Non-Army demands.
2. Items with trivial demand.
3. Items applied to more than 1 weapon system.
4. Items with management control numbers in lieu of FIINS.
5. New, terminal, or obsolete items.

APPENDIX A

IMPC CODES

A great deal of effort was made to capture the history of an item in terms of when it reached each stage of obsolescence; however, the usefulness of the result is questionable. We maintained a string of IMPC codes, one for each 2-year period. The IMPC is not dependent on existing stock levels so it should be a true indication of obsolescence. We do not need to worry about an item being coded obsolete just because existing stock is exhausted.

As each 2-year DRD was added to the previous data, which must be matched with the REFNO for the following year, the IMPC from the REFNO was added to our format. The final summary file has five fields for IMPCs:

1. From the latest requisition or from the last REFNO.
2. From the 73 REFNO.
3. From the 75 REFNO.
4. From the 77 REFNO.
5. From the NSNMDR

In the requisition files, the first of these is in the twelfth position and the second and third constitute the string. In the summary file, the first four constitute the string. The fifth IMPC, from the NSNMDR is the one we used to exclude items not applicable to demand forecasting, and is the only IMPC retained on the binary summary file.

There are two problems with our theoretical string of IMPC codes:

- a. Not all items were matched with all the REFNOs.
- b. Of the items matched, not all were found on the REFNO.

Only those items for which we have original data (1966-71) were matched with all the REFNOs. Items appearing for the first time on the 77 DRD were not matched with any REFNO. We assumed that the IMPC on the DRD was from the end of the 2-year period. Actually it is the current IMPC at the time of the requisition. If an item was not matched with a particular REFNO, the IMPC field for that REFNO year is blank or "XX".

The second problem is that not all items were found on the REFNO.
These were output with a made up code to indicate absence from the REFNO:

"QQ" in the 73 IMPC field

"RR" in the 75 IMPC field

"SS" in the 77 IMPC field

Later in the processing these items were excluded unless the last recorded IMPC code indicated that they were terminal or obsolete.

The IMPCs retained of the final file are:

- AA - Insurance
- 1B - Stocked, controlled and regulated.
- 1C - Stocked, not controlled and not regulated.
- 3A - Non-stocked, direct delivery, but centrally managed + procured
- 5A - Master item number.
- 6B - Terminal, discontinued.
- 6C - Terminal, replaced by two or more items.
- 6D - Terminal, application data needed.
- 6E - Terminal, component type replacement.
- 6F - Terminal, kit or assembly type replacement.
- 6J - Terminal, technical order, replaced.
- 6P - Terminal, cannibalization.
- 9C - Semi-active, discontinued (we treat as obsolete).
- 9D - Semi-active, obsolete.
- 9X - Semi-active.

These are prime items applicable to demand forecasting.

In general, the 9's indicate obsolete items, but 9X is an exception. 9X is one step lower than 3A, the only difference being that the 9X is manually assigned and does not automatically migrate to 1C if it passes COSDIF [AR 710-1].

APPENDIX B

PROCESSING PROBLEMS

1. When the 1966-71 data (17 individual reels) were processed against the 1973 REFNO, one reel of data (the 10th) was written over; another reel (the 6th) has so many parity errors that we chose not to use what little data was processed. The items on these two reels were skipped in subsequent runs in a fortran function in the ROLL program. This was to prevent them from appearing as new items, and must be repeated as long as the data base is added to.

The FIINs* skipped were:

From reel 6: 4923685-5752111

From reel 10: 7592886-7969734

This omission of certain FIINs creates an additional problem. If the skipped FIIN was incorporated into a new prime (in the real world) we have lost potential demands for the new prime. Its history may appear to begin in year t, when in years before t there were demands for its predecessor item. USERS BEWARE

2. When the 1966-71 data (same 17 reels) were processed against the 1973 REFNO, for the first and eighth reels, only part of the REFNO was read. This was because these two reels of the 1966-71 data spanned reels of the three reel REFNO. Since there is an EOF mark at the end of each of the three reels of the 1973 REFNO, the program did not seek out a new reel, but processed the remaining demand data as if there were no matches on the REFNO.

We decided to eliminate the data on the first and eighth reels which was not matched with the REFNO, just as we did for the previous problem.

The FIINs skipped were:

From reel 1: 0330312-0699546

From reel 8: 6595605-6931694

The same warnings apply as with the other items skipped.

* This was prior to the addition of the 2-digit NATO Code to the FIIN to produce a NIIN.

3. Additional losses were due to:

- a. Unit price change (less than 1%).
- b. Parity errors.
- c. Requisitions lost at the beginning and end of each reel.

The items with requisitions for more than one unit of issue were skipped because we had no way of combining their demands. We had no way of tracking the parity errors, although the bulk of them occurred on reel 6, and the items on this reel were excluded. The requisitions lost at the beginning and end of each reel were not dealt with.

4. We were concerned about the number of items from the 1966-71 data which were not found on the 1973 REFNO. The problem with reels 1 and 8 accounted for many of the no matches, but there was still an estimated 16% of the remaining FSNs processed that were not on the REFNO.

We did several distributions of the IMPC codes for samples of these items, and had a few individual items checked at AVSCOM. Some of the items were found to be terminal, obsolete, or other managed, but many were regular items and we could not determine why they were missing from the REFNO. We were told that the 1973 REFNO was "housekept" before we receive it, which may account for missing items; however, this seems unlikely. At this time an item was dropped from the REFNO/NSNMDR only after it had been obsolete for three years. CCSOI 18-708-103 Vol II, May 1978, covers retention of obsolete items.

The logic to exclude items for which we may not have a complete history when we should was incorporated to compensate for this problem.

APPENDIX C

NSNMDR PROCESSING

The National Stock Number Master Data Record (NSNMDR) is the primary CCSS file used to perform requisition processing, cataloging, and supply management [Vol 1 CCSSOI 18-1-25]. We receive an extract which includes three types of records: the fixed sector, sector 18, and sector 10/01.

We have NSNMDR extracts for 1971, 1975, and 1977. The 1973 data were lost. To provide header data we select one fixed sector record for each item, the latest from our set of three. There is an indicator on the new file which tells which NSNMDR the record is from.

We exclude records for items which have more than six applications (continued onto sector 18), and exclude records for which we do not have flying hours. This was done to facilitate data processing. Only 16% of the items had more than six applications and an additional 4% were dropped for lack of hours. In the case of the 4% we may have eliminated some common hardware items unnecessarily.

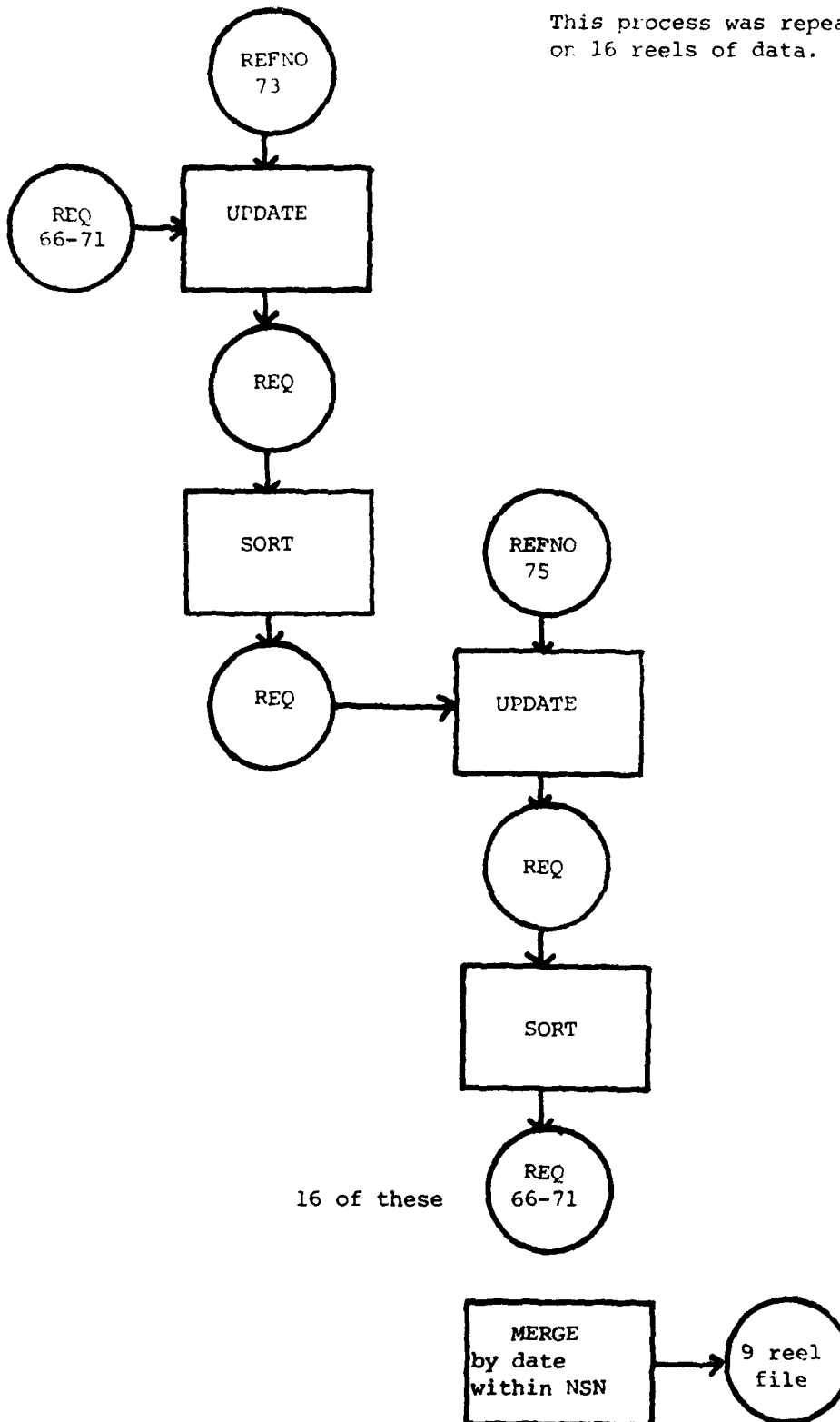
APPENDIX D
OVERVIEW OF WHAT WE DID

GIVEN: 66-71 requisition file } Will refer to these
72-73, 74-75, 76-77 DRDS } as 71, 73, 75, 77

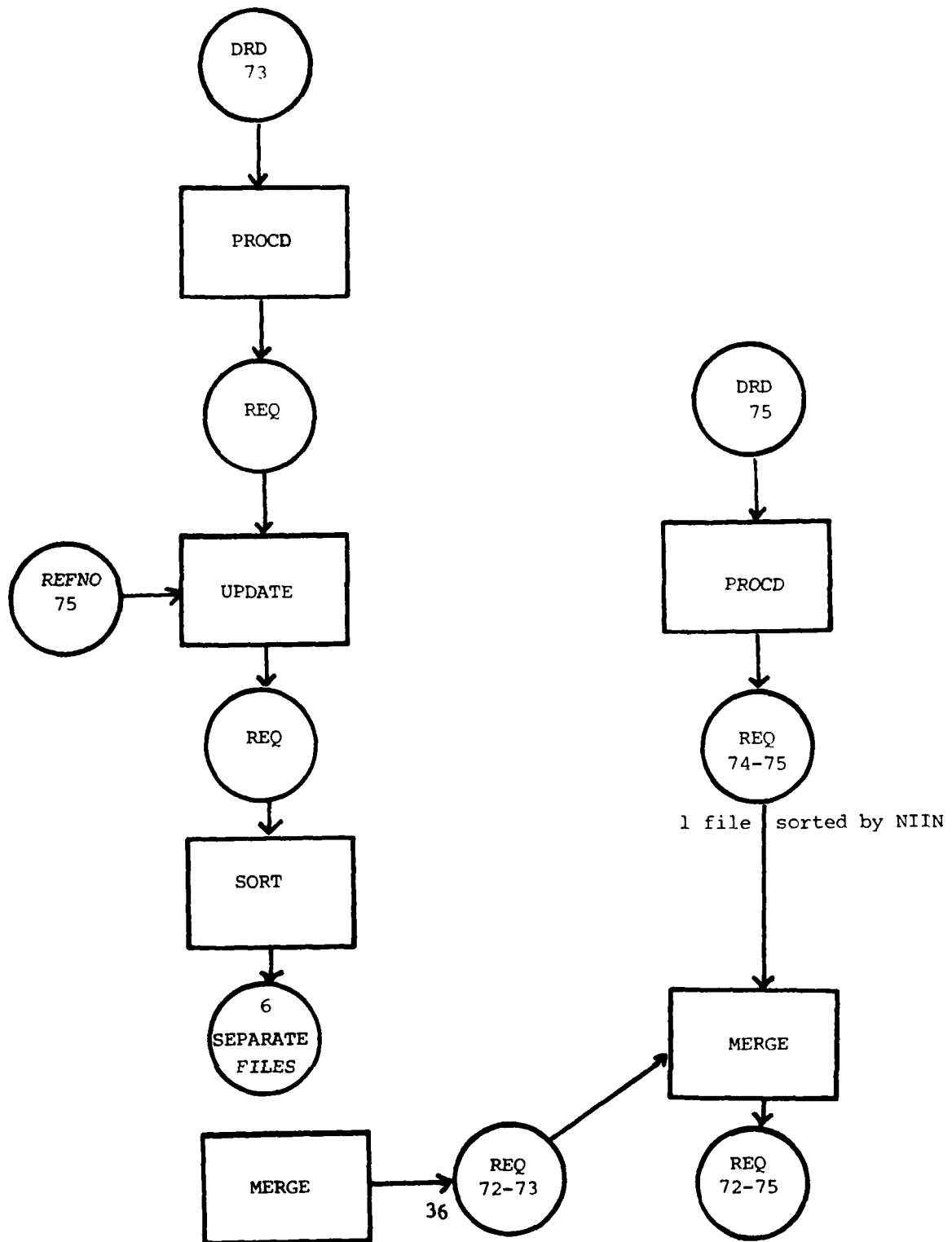
	PROGRAM	INPUT	RESULT
Preparation of old data requisitions	(1) UPDATE	71	71 data updated to 73 prime
	(2) SORT		above sorted on 73 prime
	(3) UPDATE		above updated to 75 prime
	(4) SORT		above sorted on 75 prime
	(5) MERGE		one contiguous file*
	(6) SORT		66-71 data updated to and sorted on 75 prime
Preparation of of 72-75 data requisitions	(7) PROCD	73	processed 73 data
	(8) UPDATE		73 data updated to 75 prime
	(9) SORT		above sorted on 75 prime
	(10) PROCD	75	processed 75 data
	(11) MERGE		72-75 data (requisitions)
Final data base	(12) ROLL		66-71 data rolled
	(13) ROLL		72-75 data rolled
	(14) BLEND		66-75 data rolled
	(15) UPDATE		above updated to 77 prime
	(16) SORT		above sorted on 77 prime
	(17) PROCD	77	processed 77 data
	(18) ROLL		77 data rolled
	(19) BLEND		

PROCESS FOR 66-71 DATA

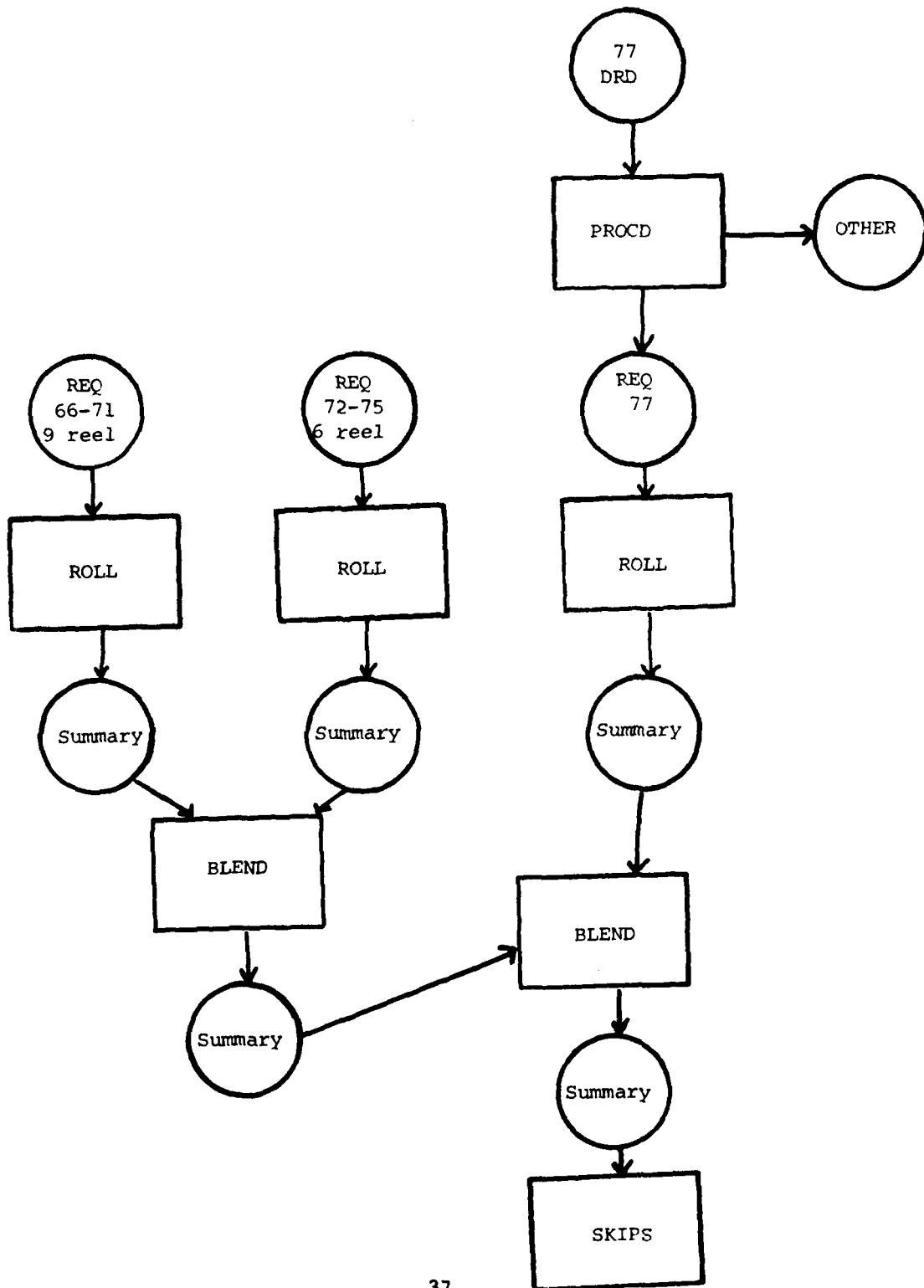
This process was repeated 16 times
on 16 reels of data.

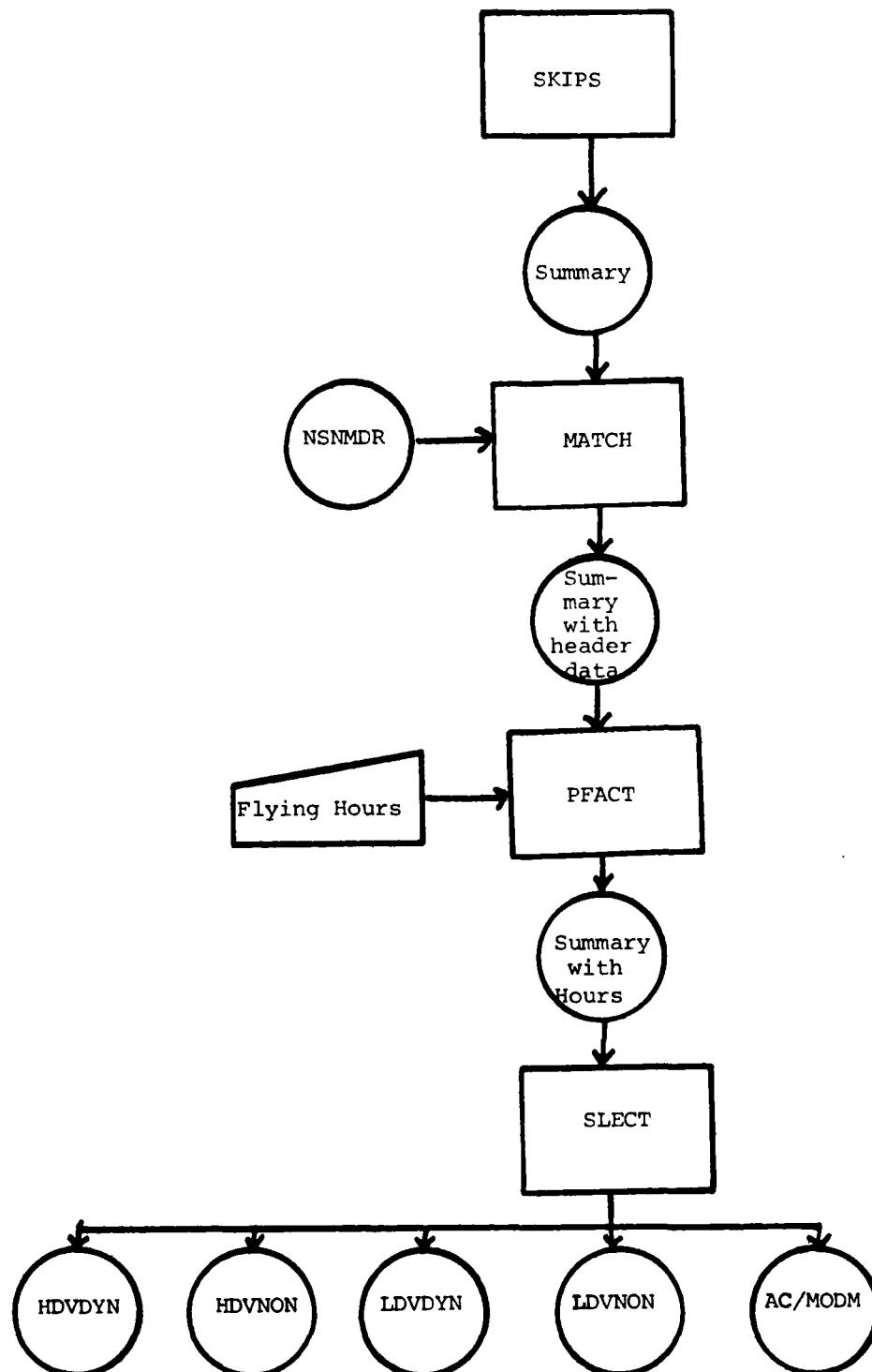


PROCESS FOR 72-75 DATA

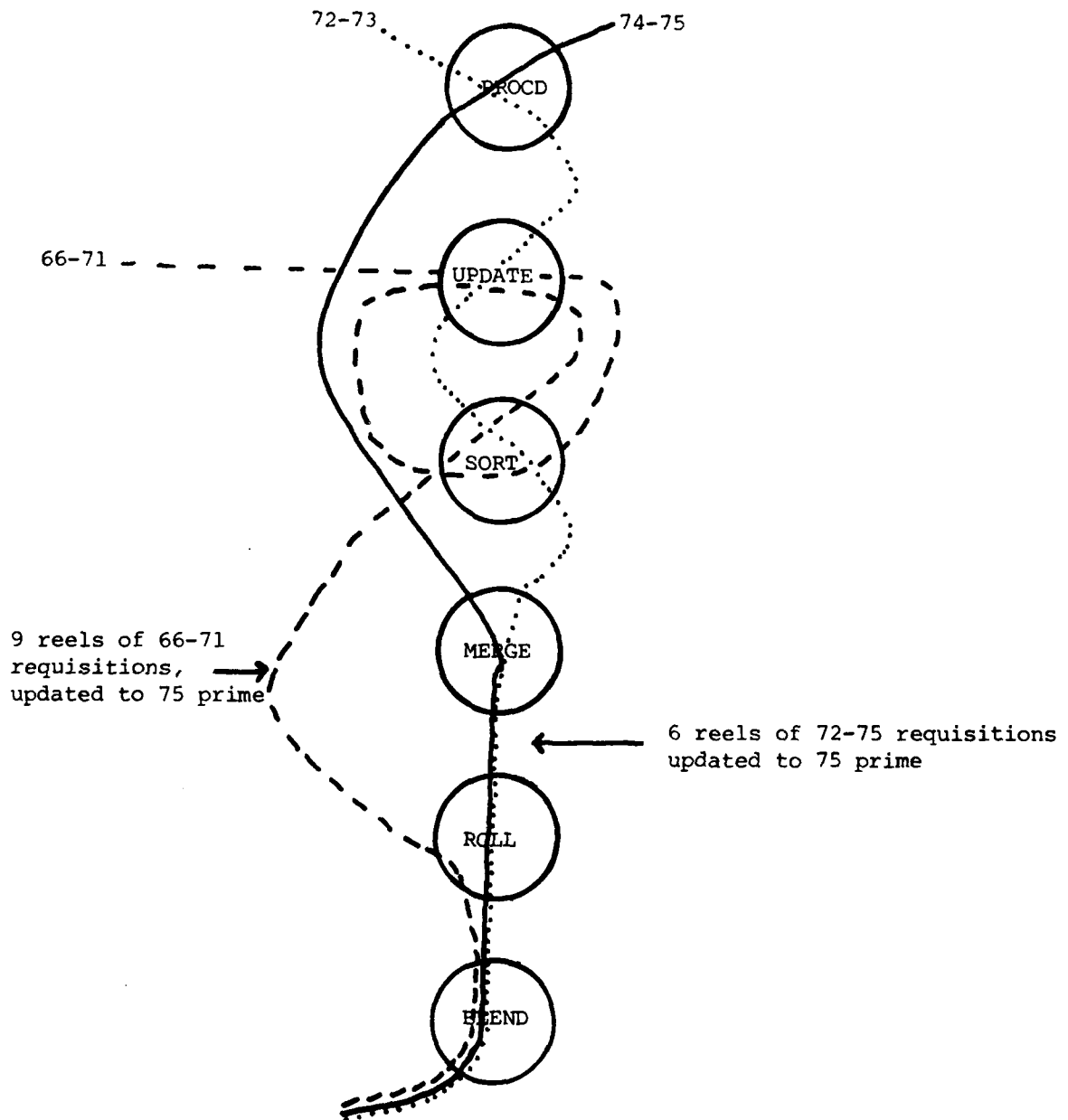


PROCESS FOR SUMMARY FILE





ACTUAL PROCESS



REFERENCES

- 1 Cohen, Martin, "Demand Forecasting with Program Factors," AMC Inventory Research Office, Final Report, September 1975.
- 2 Cohen, Martin, "ALPHA 4140.39 Simulator," AMC Inventory Research Office, Technical Report, May 1973.
- 3 CCSSOI 18-1-25 Vol 1, DRD File Guide.

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